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A Performance Evaluation of Apache Kafka in Support of Big Data Streaming Applications

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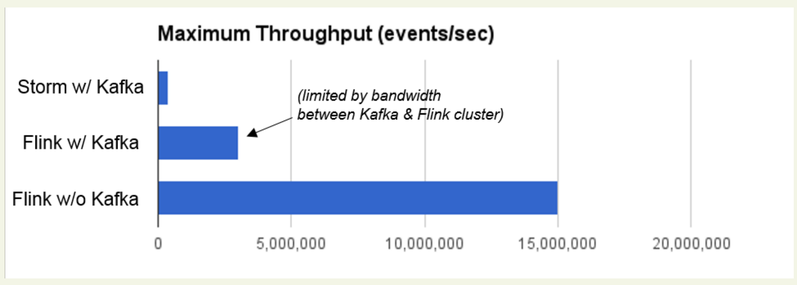
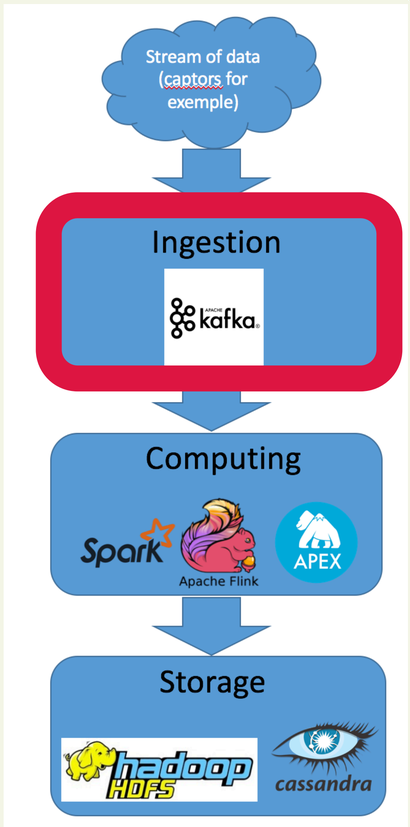
1. Context

- **Stream computing:** a new paradigm enabling real-time Big Data processing through 3 steps
  - Ingestion: Apache Kafka
  - Processing: Apache Spark / Flink
  - Storage: HDFS, Cassandra
- **Ingestion** can be a **bottleneck** for stream processing

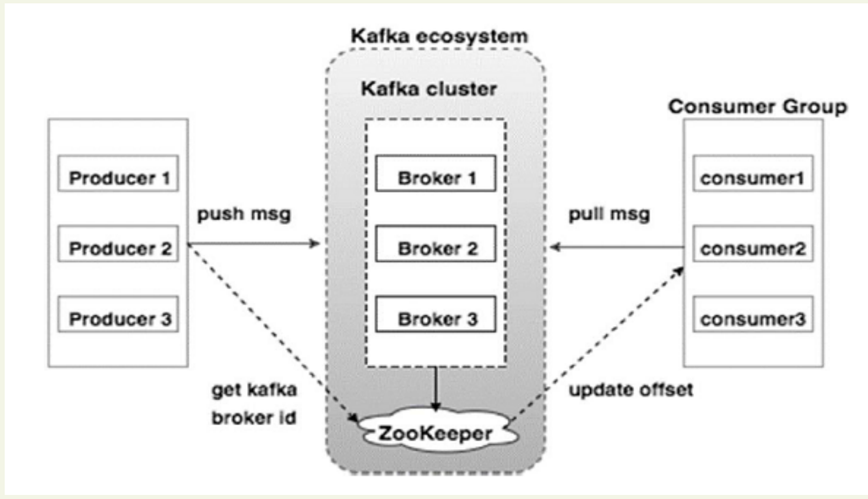




2. Contribution

- Identify the **impact of different parameter** settings on Kafka's overall performance
- **Experiment evaluation** of several configurations and performance metrics of Kafka
- Allow users to **avoid bottlenecks** and **achieve good practice** for stream processing

3. Kafka Architecture

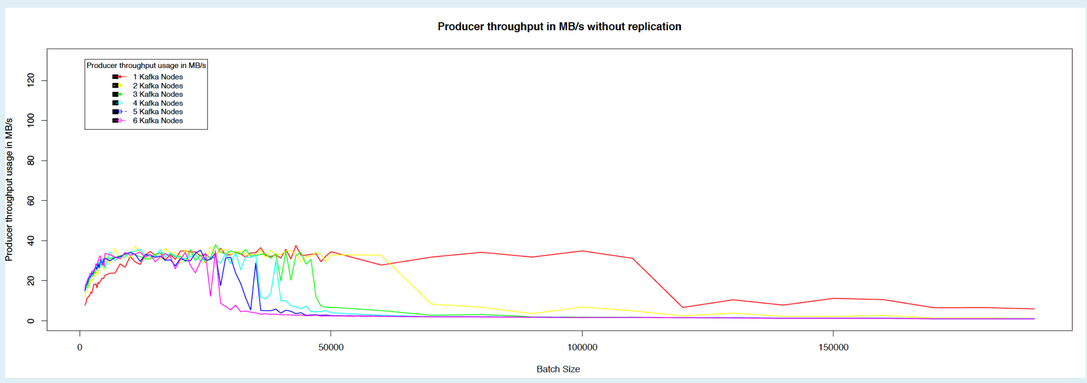


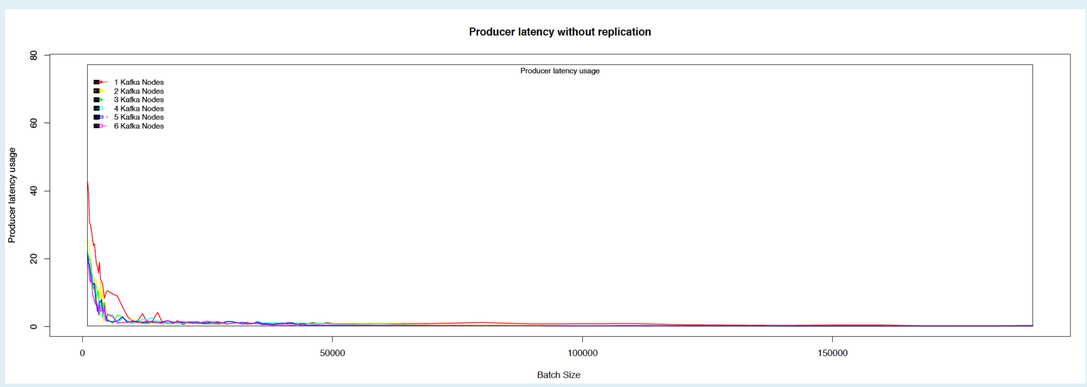
4. Methodology

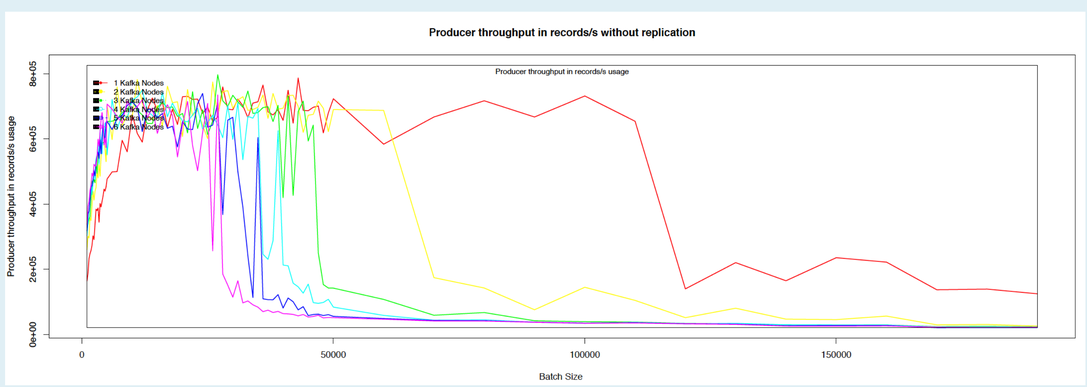
- **Isolate the performance of each Kafka component**
- Separated tests for Producers and Consumers
- Make **correlations** between configuration parameters, resource usage and performance metrics
- Experiments executed on **Grid5000**
- Up to **32 nodes** (16 cores per nodes, 28 GB RAM, 10 Gigabit Ethernet)

5. Results

Producer performances when modifying batch size for several number of nodes and a message size of 50B







6. Key metrics

Parameters :

- Message size
- Batch size
- Acquirement strategy
- Network and disk I/O threads
- Message replication
- Hardware

Performance Metrics:

- Throughput (MB/s, items/s)
- Latency
- CPU usage
- Disk usage
- Memory usage
- Network usage

7. Take-aways

- The variation of the batch size shows that there is a range of batches with a better performance.
- When varying the number of nodes in some scenarios: a sudden performance drop (probably due to the internal Kafka synchronizations as well as the underlying network).
- Future work : evaluating reference processing frameworks (Apache Spark and Flink)

Bibliographie / sources

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- 2. http://www.tutorialspoint.com/apache_kafka/

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